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NOTES ON THE EARLY STAGES AND LARVAL LOCOMOTION OF *LEIA BIVITTATA* SAY<sup>1</sup> (DIPTERA).

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Several specimens of this fungus gnat were bred during the last of March from the partly decomposed fruiting bodies of *Lenzites betulina*, which had been collected during February on an old stump at New Brunswick, N. J., and kept in a warm room. It is evidently a well distributed species as it was described by Say from Indiana, and Johannsen<sup>2</sup> records it from Connecticut, Rhode Island, North Carolina, Wisconsin, Illinois, Kansas, Minnesota, Iowa, Michigan and New York. In Aldrich's Catalogue of North American Diptera it is listed as *Neoglaphyroptera bivittata* Say, and Smith<sup>3</sup> records it under the same name from several points in New Jersey.

Full grown larvæ under observation averaged about 13 mm. in

<sup>1</sup> Kindly identified by C. W. Johnson.

<sup>2</sup> Fungus Gnats of North America, Part III, p. 290, Maine Agric. Exp. Sta. Bull. 196.

<sup>3</sup> Insects of New Jersey, N. J. State Mus. Rept. 1909.

length and 1 mm. in width, each being apodous, subcylindrical, elongated, slightly tapering toward anterior and posterior ends, twelve-segmented, whitish, transparent showing tracheæ and alimentary canal, with dark brown or brownish-black oval head slightly retracted in first segment, and having eight pairs of spiracles protected by chitinized, conical projections, one pair on first segment and remaining pairs on first seven abdominal segments.

The pupa is about 5.5 mm. long, free, whitish, smooth, with legs applied to the breast and venter, the antennæ bent around the eyes and extending between the wings and legs and with six pairs of distinct abdominal spiracles and each prothoracic spiracle located behind the antenna and above the root of the wing. The pupa is suspended and surrounded by a network of threads which can hardly be called a cocoon. This stage requires only four or five days. Hibernation evidently takes place in the partly grown larval condition and the larvæ resume feeding and pupate during the spring. Both the larvæ and pupæ are very similar to those of many other members of the family Mycetophilidae as treated by Williston,<sup>1</sup> Johannsen<sup>2</sup> and Osten Sacken.<sup>3</sup>

The locomotion of the larva is peculiar and interesting. To begin with, the larva is completely clothed except for the head, in a transparent, elastic mucus-like, skin or film, which conforms to the shape of the larva and which is as a result somewhat like a tube or tunnel. When the larva desires to move over the fungus, it stretches its head forward and to one side and fixes the tip of a drop of viscous matter from its mouth to the surface of the fungus. The head is then withdrawn and raised somewhat, the withdrawal resulting in the drop of viscous matter being pulled out into a thread and the raising allowing the remainder of the drop in the larva's mouth to slide back along the outer lower side of the first segment to be added to the mucus envelope already covering its body. It then stretches its head to the other side, sometimes slightly more forward and repeats the operation. This is kept up as long as it continues to move, the larva thus covering itself with a mucus tube through which it slides and anchoring or mooring this tube to the surface over which it moves by somewhat elastic, lateral threads,

<sup>1</sup> Manual of North American Diptera.

<sup>2</sup> Fungus Gnats of North America, Parts I, II, III, IV, Maine Agric. Exp. Sta. Bulls. 172, 180, 196, 200.

<sup>3</sup> Characters of the Larvæ of Mycetophilidae, Proc. Ent. Soc. Philadelphia, 1862.

there being from five to nine placed on each side over every distance equal to its length. These threads are at times opposite each other but are more often somewhat alternate.

As the larva moves forward, the mucus tube collapses behind its posterior end and remains as a flat, glistening trail. This trail is more or less broken and ragged in places; sometimes the anchoring threads break and sometimes the empty tube breaks as the larva travels in and out and over and around obstructions, etc., in its path. In fixing its mooring threads and building or adding to its transparent covering the larva moves its head in a quick, jerky fashion and altogether can glide along fairly rapidly. Excrement, particles of fungus and other foreign matter which adhere to the tube as the larva works in the fungus remain stationary and the larva simply slides under them.

Sometimes, but apparently not often, the larva reverses its forward motion and slides backward for a short distance filling the collapsed portion of the tube again. When it reaches its desired position, it bites through the portion covering its head and starts off in a new direction. If, in its forward movement, it has misplaced its mooring threads, it bites through them thus releasing the anterior part of its tube. In this manner it travels over and in the fungus feeding as it goes.

Before pupating, larvæ under observation anchored their tubes in spaces between pieces of fungi in the cage using quite a few more supporting threads for this operation than they used in anchoring their tubes while moving and so placing them that the tube and later the pupa was suspended in a network and did not touch any part of the fungus. These threads were not numerous or close enough, however, to even slightly resemble a loosely built cocoon.

According to Perris<sup>1</sup> the larva of *Sciophila unimaculata* moves in a similar way. An interesting account of the habits of this species, which Perris found associated with the fungus *Polyporus versicolor*, together with descriptions and figures of the larva and pupa is given in his paper, "Note pour servir à l'histoire de la *Sciophila unimaculata* Macq."<sup>2</sup>

<sup>1</sup> Ann. Soc. Ent. France 2; 7; p. 341-50, 1849.

<sup>2</sup> Loc. cit.